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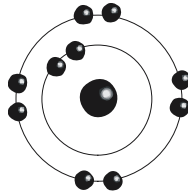
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Montana Science Grade 10 Sample Multiple-Choice Items

PHYSICAL SCIENCE

1. Below is a historical model of an atom. It shows electrons orbiting the nucleus.



With respect to chemical reactions, what would the atom represented by this model do?

- A. gain an electron
 - B. lose an electron
 - C. share an electron
 - D. not react
2. John threw a softball to Maria. She hit the softball with a bat and then the bat broke. Which statement explains why the bat broke?
- A. The softball was moving at the same rate as Earth rotates on its axis.
 - B. The softball was accelerating toward Maria after it left John's hand.
 - C. The softball suddenly decreased the air resistance acting on the bat as it was swinging.
 - D. The softball exerted the same amount of force on the bat as the bat exerted on the softball.
3. Which characteristic **best** explains why electromagnetic waves are both useful and harmful to humans?
- A. They interact with matter as they pass through it.
 - B. They travel at the speed of light in a vacuum.
 - C. They can travel through matter or a vacuum.
 - D. They have an electric field and a magnetic field.

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LIFE SCIENCE

4. Water passively enters an animal cell through diffusion across the cell membrane. What would **most likely** happen if the cell did not actively remove excess water?
- A. The chemical reactions in the cell would speed up.
 - B. The cell would burst and thus be destroyed.
 - C. The cell's DNA would dissolve and break apart.
 - D. The parts of the cell would become more flexible.
5. Which statement is true about the chemical structure of DNA?
- A. It contains codes for making proteins.
 - B. It is made up mostly of water.
 - C. It is a complex carbohydrate.
 - D. It stores energy for a cell's chemical reactions.
6. Read the paragraph below to answer the question.

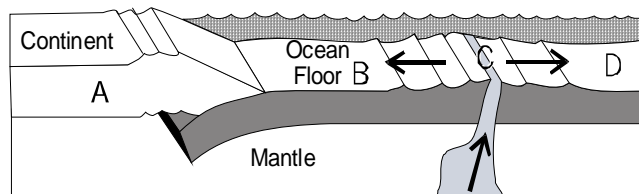
Five hundred flies of the same species were sprayed with a new insecticide. A day later, nearly all the flies were dead. However, a few survived.

- Which statement **best** explains why some flies survived?
- A. Animals adapt to new environments.
 - B. New species develop from survivors.
 - C. There is variation within a species.
 - D. Insecticides cause genes to mutate.

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EARTH SCIENCE

7. Nearly 100 years ago, a large volcano erupted in the South Pacific. The following year most of the Northern Hemisphere experienced a cool summer and a very cold winter. Which statement explains how these events were related?
- A. The eruption caused the greenhouse effect to increase.
 - B. The eruption caused a large hole in the ozone layer.
 - C. Lava from the eruption caused a temporary increase in Earth's total heat energy.
 - D. Air particles from the eruption caused less solar energy to reach Earth's surface.
8. The diagram below represents a divergent plate boundary similar to the one found along the mid-Atlantic ridge.



- At which location would the most recently formed rock be found?
- A. location A
 - B. location B
 - C. location C
 - D. location D
9. How have scientists determined what elements are in stars other than the Sun?
- A. by sending space probes to some of the stars
 - B. by analyzing electromagnetic waves given off by the stars
 - C. by examining black and white photographs taken with telescopes
 - D. by studying similar conditions in particle accelerators

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Sample Constructed-Response Item

LIFE SCIENCE

10. Before the invention of the microscope, scientists classified all living things into two kingdoms – plants and animals.
- a. Describe **two** characteristics of organisms that the microscope allowed scientists to observe for the first time.
 - b. Discuss how the invention and further improvements in the microscope led to classification systems with more than just two kingdoms.

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Answer Key

1. D
2. D
3. A
4. B
5. A
6. C
7. D
8. C
9. B

10. Sample Answers – Other answers may also be acceptable.

a. The microscope allowed scientists to see smaller organisms than had ever been seen before. Some of these organisms such as bacteria, amoeba, paramecium, and yeast consisted of single cells. With the improvement of the microscope (such as the electron microscope) finer cell structures were found such as mitochondria and ribosomes.

b. Some organisms blurred the distinction between plants and animals [such as Euglena] by being able to carry on photosynthesis and move about. Some of the cells were found to have organized nuclei and others did not. The organisms that do not have an organized nucleus were placed in a kingdom of their own [called Monera]. The remaining organisms that were not clearly either plant or animal are grouped in two other kingdoms [called Protista and Fungi].

Note: Specific names of kingdoms are not necessary. Also, some students may have studied a five kingdom system (as given in the sample answer above) whereas other students may have studied classification systems having a different number of kingdoms.